

With regard to the objections to the drawings, new drawings have been submitted herewith under separate cover illustrating the claimed distances. Applicants respectfully submit that no new matter has been added by way of this amendment to the drawings.

With regard to the objection to the title of the invention, the title has been amended to read "Image Forming Apparatus Including An Electronic Field Having An Oscillation Component Between An Image Carrier And A Developer Carrier." Applicants respectfully submit that this objection has been overcome. However, if the Examiner disagrees, the Examiner is respectfully requested to provide a suitable title in the next Office Action.

In response to the rejection of Claims 3, 4, 6 and 8-10 under 35 U.S.C. § 112, second paragraph, Applicants have amended Claims 3, 4, 6, and 8-10 to remove the noted informalities. Accordingly, Applicants respectfully submit this rejection has been overcome.

In response to the rejection of Claim 8 under 35 U.S.C. § 102(b) as anticipated by Nagao (U.S. Pat. No. 5,991,586), Applicants respectfully traverse this rejection. One of the elements recited in Claim 8 includes "an electric field including an oscillation component is formed between said image carrier and said developer carrier."

Nagao relates to a developing device including a magnetic regulating member. Nagao describes that a magnetic pole S of the magnet member exhibits a relatively unchanging and flat vertical magnetic force.<sup>3</sup> Nagao fails to disclose or suggest any information relating to an electric field. Consequently, Applicants respectfully submit that Nagao fails to disclose or suggest: "an electric field including an oscillation component ... formed between said image carrier and said developer carrier." Accordingly, Applicants respectfully submit that the

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<sup>3</sup>Nagao, col. 4, lines 50-55.

Office Action has failed to satisfy the burden set forth in 35 U.S.C. § 102. Applicants therefore respectfully request that the rejection of Claim 8 be withdrawn.

In response to the rejection of Claims 5-7 under 35 U.S.C. § 103(a) as unpatentable over Saijo et al. (U.S. Pat. No. 4,825,241, hereafter Saijo) in view of Shoji et al. (U.S. Pat. No. 5,937,228, hereafter Shoji), Applicants respectfully traverse this rejection for the reasons discussed below. Claim 5, from which Claims 6 and 7 depend, recites: “a ratio of a shortest distance between said image carrier and said developer carrier to a shortest distance between said developer carrier and a metering member, which regulates the developer, is smaller than 0.8, and an electric field including an oscillation component is formed between said image carrier and said developer carrier.”

MPEP § 716.02(c) states “Evidence of unexpected results must be weighed against evidence supporting *prima facie* obviousness in making a final determination of the obviousness of the claimed invention.” Applicants respectfully submit that the Applicants’ claimed limitations recited in the pending independent claims are the result of the Applicants’ discovery of unexpected benefits through the Applicants’ inventive efforts, and are not obvious in light of the references of record.

As evident from Figures 14 and 15 of the present application, the Applicants have determined that an AC bias (oscillation component), when combined with a particular ratio (Gp/Gd) as recited in the claims produces an unexpectedly superior quality of image. Specifically, when an AC bias is combined with the claimed ratio Gp/Gd, an improvement in granularity is achieved. With a ratio of Gp/Gd less than .8 and an AC bias, the range of granularity is from 3 to 4.5. By contrast, when a DC bias is applied and combined with the claimed ratio of Gp/Gd, as illustrated in Figure 14, there is not much improvement in granularity. Accordingly, it is only through the Applicants’ teaching in the present

application and their discovery through experiment, as illustrated in Figures 14 and 15, that such benefits become obvious.

Saijo relates to an electrostatic latent image developing device including a rotatable developing sleeve and multiple fixed magnets.<sup>4</sup> Saijo describes that a distance between an image developer carrier and metering member is in a range of .4-.75 mm.<sup>5</sup> However, as noted in the Office Action, Saijo does not disclose or suggest the developing bias of the present invention.

Shoji relates to an image forming apparatus with an oscillation electric field in a developing region.<sup>6</sup> However, Shoji does not relate to particular ratio of any elements of the image forming apparatus. Specifically, Shoji does not disclose or suggest that a particular distance between an image developer carrier and a metering member would achieve improved results when combined with the oscillation electric field.

As noted above, it was the Applicants' efforts and experimentation that led to the discovery of the particular benefits of the claimed Gp/Gd ratio combined with an AC bias as recited in independent Claim 5. Accordingly, Applicants respectfully submit that pending Claim 5 patentably distinguishes over Saijo and Shoji, either alone or in combination. Likewise, pending dependent Claims 6 and 7 are considered to patentably distinguish over Saijo and Shoji for the reasons above-noted with respect to Claim 5, from which these claims depend.

Moreover, Applicants respectfully submit that there is no basis in the teachings of either Saijo or Shoji in support of the proposed combination. Certainly, the Office Action

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<sup>4</sup>Saijo, Abstract.

<sup>5</sup>Id. at col. 5, line 33.

<sup>6</sup>Shoji, Abstract.

fails to point to any teachings in either of the references to support the combination.

Accordingly, Applicants respectfully submit that the proposed combination is based solely upon hindsight, as it is only in view of the teachings of the present specification that the Applicants' claimed limitations become obvious.

In response to the rejection of Claims 9 and 10 under 35 U.S.C. § 103(a) as unpatentable over Nagao in view of Shoji, Applicants respectfully traverse this rejection for reasons similar to those above noted with respect to Claims 5-7. Claims 9 and 10 depend from Claim 8.

The features claimed in Claim 8 were determined based on the experimental results presented in Figures 16 and 17. Like the results presented in Figures 14 and 15, it is evident that the Applicants' inventive efforts determined that the claimed ratio of Gp/p provides unexpectedly improved quality images. Accordingly, as it is only in light of the Applicants' teachings in the present specification that the claimed limitations become obvious, Applicants respectfully request that this rejection be withdrawn.

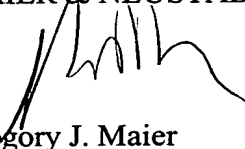
With regard to the provisional rejection of Claims 1 and 2 under the judicially created doctrine of double patenting as unpatentable over co-pending application no. 09/852,212 in view of Shoji, Applicants respectfully request reconsideration. The present invention, as noted above, obtained results that were unexpected to those of ordinary skill in the art through the combination of a specific distance ratio combined with an AC bias. Accordingly, Applicants respectfully request that this rejection be withdrawn.

Likewise, the provisional rejection of Claims 1, 3, and 4 as unpatentable over co-pending application no. 09/852,212 in view of Nagao is traversed for reasons similar to those discussed above.

Consequently, in view of the foregoing discussion and present amendments,  
Applicants respectfully submit that the pending application is in condition for immediate  
allowance. An early and favorable action is therefore respectfully requested.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,  
MAIER & NEUSTADT, P.C.



Gregory J. Maier  
Registration No. 25,599  
Robert T. Pous  
Registration No. 29,099  
Attorneys of Record



**22850**

Tel. (703) 413-3000  
Fax. (703) 413-2220  
(OSMMN 10/00)

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IN THE TITLE

At page 1, before line 1, please delete the title in its entirety and substitute therefor:

[IMAGE FORMING APPARATUS]

--IMAGE FORMING APPARATUS INCLUDING AN ELECTRIC FIELD  
HAVING AN OSCILLATION COMPONENT BETWEEN AN IMAGE  
CARRIER AND A DEVELOPER CARRIER--

IN THE CLAIMS

1. (Amended) In an image forming apparatus for forming a magnet brush on a developer carrier and causing said magnet brush to contact a latent image formed on an image carrier to thereby develop said latent image, said developer carrier comprises a sleeve and a stationary magnet roller accommodated in said sleeve,

said magnet roller includes a main pole [for causing] configured to cause the developer to rise in a form of the magnet brush and an auxiliary pole [helping] configured to help said main pole exert a magnetic force,

a ratio of a distance between said image carrier and said developer carrier, as measured at a boundary of a nip for development, to a shortest distance between said image carrier and [said developer carrier] a metering member is 1.5 or below, and an electric field

including an oscillation component is formed between said image carrier and said developer carrier.

2. (Amended) The apparatus as claimed in claim 1, wherein the oscillation component [has] comprises an asymmetric, rectangular waveform [so] configured [as] to reduce a period of time over which toner contained in the developer migrates toward said image carrier.

3. (Amended) The apparatus as claimed in claim 1, wherein the oscillation component [occurs] is configured to oscillate at least ten times within a period of time [in] during which a given point on said image carrier moves away from a range in which the magnet brush remains in contact with said image carrier.

4. (Amended) The apparatus as claimed in claim [3] 2, wherein the oscillation component [occurs] is configured to oscillate at least ten times within a period of time in which a given point on said image carrier moves away from a range in which the magnet brush remains in contact with said image carrier.

5. (Amended) In an image forming apparatus for forming a magnet brush on a developer carrier and causing said magnet brush to contact a latent image formed on an image carrier to thereby develop said latent image, said developer carrier comprises a sleeve and a stationary magnet roller accommodated in said sleeve,

said magnet roller includes a main pole [for causing] configured to cause the developer to rise in a form of the magnet brush and an auxiliary pole [helping] configured to help said main pole exert a magnetic force,

a ratio of a shortest distance between said image carrier and said developer carrier to a shortest distance between said developer carrier and a metering member, which regulates the developer, is smaller than 0.8, and

an electric field including an oscillation component is formed between said image carrier and said developer carrier.

6. (Amended) The apparatus as claimed in claim 5, wherein the oscillation component [occurs] is configured to oscillate at least ten times within a period of time in which a given point on said image carrier moves away from a range in which the magnet brush remains in contact with said image carrier.

7. (Amended) The apparatus as claimed in claim 5, wherein the oscillation component [has] comprises an asymmetric, rectangular waveform [so] configured [as] to reduce a period of time over which toner contained in the developer migrates toward said image carrier.

8. (Amended) In an image forming apparatus for forming a magnet brush on a developer carrier and causing said magnet brush to contact a latent image formed on an image carrier to thereby develop said latent image, said developer carrier comprises a sleeve and a stationary magnet roller accommodated in said sleeve,

said magnet roller includes a main pole [for causing] configured to cause the developer to rise in a form of the magnet brush and an auxiliary pole [helping] configured to help said main pole exert a magnetic force,

a ratio of a shortest distance between said image carrier and said developer carrier to an amount of the developer scooped up to said image carrier is smaller than  $10 \frac{mm}{g/cm^2}$ , and an electric field including an oscillation component is formed between said image carrier and said developer carrier.

9. (Amended) The apparatus as claimed in claim 8, wherein the oscillation component [occurs] is configured to oscillate at least ten times within a period of time in



which a given point on said image carrier moves away from a range in which the magnet brush remains in contact with said image carrier.

10. (Amended) The apparatus as claimed in claim 8, wherein the oscillation component [has] comprises an asymmetric, rectangular waveform [so] configured [as] to reduce a period of time over which toner contained in the developer migrates toward said image carrier.



Fig. 10

